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EXAMINER
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ART UNIT 2879	PAPER NUMBER 6
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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/218,816

Applicant(s)

JOHNSON ET AL.

Examiner

Matthew J. Gerike

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 21, 22, 40 and 41 is/are allowed.
- 6) ☐ Claim(s) 1-6, 17-20, 23-35, 38, 39, 42 and 43 is/are rejected.
- 7) ☒ Claim(s) 7-16, 36 and 37 is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

Response to Amendment

The arguments are moot in light of the new grounds of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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²⁸⁻³⁵
Claims 2, 3, 27, and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 2, the term "partially" in claim 2 is a relative term which renders the claim indefinite. The term "partially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Correction is required.

Claim 3 is necessarily rejected due to its dependency upon claim 2.

With respect to claim 27, the term "larger" in claim 27 is a relative term which renders the claim indefinite. The term "larger" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Correction is required.

Claims 28-35 are necessarily rejected due to their dependency upon claim 27.

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With respect to claim 42, the phrase, "said column contact layers extending adjacent at least a portion of selected side walls to help reduce optical cross talk between the radiation sources" cannot be definitively interpreted by the examiner. Correction is required.

Claim 43 is necessarily rejected due to its dependency upon claim 42.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1, 4-6, 18, 20 & 23-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Vriens et al. (U.S. 5,813,753).

Vriens discloses a light emitting device comprising a phosphor layer (54 phosphor layer figure 5) having two opposing sides including one or more excitable, light emitting phosphors; a radiation source (51 LED stack) positioned adjacent a first one of the two opposing sides of the phosphor layer for providing a radiation to excite a light emission from the phosphor layer, the radiation source having a first contact region and a second contact region (first and second ohmic contact figure 1) and reflector means (53 mirror, 37 LWP filter, 47 SWP filter, 56 glass plate UV reflecting, or UV and visible mirror, see column 7, lines 9-10) provided adjacent (figure 5) a second one of the

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two opposing sides of the phosphor layer for reflecting at least some of the radiation and light emission that exits from the phosphor layer back into the phosphor layer see column 5, lines 1-10, as recited in claim 1. The term, "adjacent" does not require absolute contact, but requires relatively close position. Ex parte Hadsel (Patent Office Board of Appeals 109 USPQ 509).

Virens discloses a visible light emitting device (figure 5) comprising, a transparent substrate (56 glass plate, figure 5) a phosphor layer (phosphor 54) including one or more excitable, visible light emitting phosphors, a radiation source (51 LED stack, figure 5) positioned between the transparent substrate and the phosphor layer (at least some of the phosphor layer of figure 5 is between the LED stack and some of the glass plate of Virens) for providing a radiation to excite visible light emission from the phosphor layer, the radiation source having a first contact region (n-type contact, figure 1b) and a second contact region (p-type contact, figure 1b); a first contact layer (ohmic contact 1 and mirror 53) provided over at least part of the phosphor layer and reflecting at least some of the radiation that travels through the phosphor layer back into the phosphor layer, the first contact layer being electrically connected to the first contact region; and a second contact layer (ohmic contact 6, figure 1b) being electrically connected to the second contact region (p-type electrode) as recited in claim 4.

Wherein the phosphor layer includes one or more UV excitable visible light emitting phosphors, and the radiation source is a UV radiation source emitting ultraviolet radiation as recited in claim 5.

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Vriens discloses a device further including a UV mirror (LWP filter 37, column 4, line 65-column 5 line 16) being positioned between the UV radiation source and the transparent substrate and being at least partially transparent to visible light as recited in claim 6.

Wherein the radiation source is a GaN based light emitting diode (column 2, lines 8-16) as recited in claim 18.

Wherein one or more excitable, visible light emitting phosphors, produces a visible light emission having a color that is selected from the group consisting of red, green and blue as recited in claim 20.

Vriens discloses a light emitting device comprising a radiation source (LED Stack, 21, 31 & 41) having a first contact region (figure 1b, n type layer) and a second contact region (figure 1b, p type layer) the radiation source having a top surface and one or more side walls, a phosphor layer (phosphor 54) provided adjacent to at least a portion of the one or more side walls of the radiation source, the phosphor layer including one or more excitable, light emitting phosphors (light emitting phosphor, column 3, lines 51-56) that produce a light emission when excited by radiation as specifically recited in claim 23.

Wherein a transparent substrate (glass plate 26 figure 2, 36 figure 3, 46 figure 4, 56 figure 5) is positioned below the radiation source, a first contact layer (ohmic contact 1) for providing an electrical connection to the first contact region of the radiation source

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and a second contact layer (ohmic contact 6) for providing an electrical contact to the second contact region of the radiation source as recited in claim 24.

Wherein the phosphor layer includes one or more UV excitable (column 3, lines 51-56), visible light emitting phosphors, and the radiation source is a UV radiation source (column 2, lines 3-5) as recited in claim 25.

Wherein the radiation source has a bottom portion that has a first conductivity (n-type) a top portion has a second conductivity (p-type) and an active region therebetween (active layer, figure 1b) as recited in claim 26.

Wherein the bottom portion has a larger base region (see figure 1b) and an upper column region (see figure 1b) defining a lower portion of the side walls of the radiation source as recited in claim 27.

Wherein the top portion (p-type layers) of the radiation source defines an upper portion of the side walls of the radiation source as recited in claim 28.

Wherein the bottom portion of the radiation source corresponds to the first contact region of the radiation source as recited in claim 29.

Wherein the bottom portion of the radiation source is an N-type semiconductor as recited in claim 30.

Wherein the top portion of the radiation source corresponds to the second contact region of the radiation source as recited in claim 31.

Wherein the phosphor layer only extend laterally away from the side walls of the radiation source a selected distance, at least in one direction, to define a top wall and one or more side walls (see figure 5) as recited in claim 32.

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Wherein the first contact layer (ohmic contact 6, figure 1b) is provided over at least part of the top wall of the phosphor layer as recited in claim 33.

Wherein the first contact layer is provided over at least part of the one or more side walls of the phosphor layer as recited in claim 34.

Wherein the first contact layer is electrically connected to the bottom portion of the radiation source as recited in claim 35.

Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Singer (U.S. 5,813,752).

Singer discloses a light emitting device (UV/Blue LED-phosphor device 10, see figure 1) comprising a phosphor layer (32) having two opposing sides including one or more excitable, light emitting phosphors; a radiation source (16 LED column 3, lines 6-10) positioned adjacent (the term, "adjacent" does not require absolute contact, but requires relatively close position) a first one of the two opposing sides of the phosphor layer for providing a radiation (UV) to excite a light emission from the phosphor layer, the radiation source having a first contact region (18 N type junction) and a second contact region (24 P type junction) and reflector means (15 mirror, 30 SWP layer or 42 reflector, figure 2) provided adjacent a second one of the two opposing sides of the phosphor layer for reflecting at least some of the radiation and light emission that exits from the phosphor layer back into the phosphor layer as recited in claim 1.

Wherein the reflector means comprises a first contact layer (14 contact) positioned over at least part of the phosphor layer, the first contact layer being at least

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partially reflective and at least partially electrically conductive, and first contact layer being electrically connected to the first contact region (18 & 19 N type electrode) as recited in claim 2.

Wherein a second contact layer (26 contact) is electrically connected to the second contact region (22 & 24 P type layer) as recited in claim 3.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens et al. (U.S. 5,813,753) in view of Razeghi (U.S. 5,834,331).

With respect to claims 17 and 38, Vriens discloses a device wherein the first contact region is formed from at least in part aluminum (AlGaAs and InGaAlP, column 1, lines 23-36) yet fails to disclose a contact layer formed from aluminum, or at least in part of aluminum. Yet, Razeghi discloses a device with a contact layer made in part of aluminum. Hence it would have been obvious to use aluminum as disclosed by Razeghi in the contact layer of Vriens to construct an emitting device with high quantum efficiency as taught by Razeghi in column 1, lines 33-42.

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Wherein the device further comprises a second contact layer (ohmic contact 6) as disclosed by Vriens, the second contact layer electrically connected to the top portion of the radiation source (figure 1b) as recited in claim 39.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens et al. (U.S. 5,813,753) in view of Chai (U.S. 5,625,202).

Vriens discloses all the limitations of claims 19, yet fails to disclose a device wherein the transparent substrate is formed at least in part of sapphire. Yet Chai discloses a visible light emitting device wherein a single crystal sapphire substrate is used due to sapphire's outstanding ability to grow LED thin films (column 2, lines 58-64). Hence it would have been obvious to one of skill in the art to combine the sapphire substrate of Chai with the device of Vriens to construct a visible light emitting device that was easy to manufacture due to the lattice matching of device materials and sapphire.

Allowable Subject Matter

Claims 7-16, 36 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach or disclose a visible light emitting device wherein the radiation source has a top surface, one or more side walls, and a lower portion that extends laterally outward from the one or more side walls, the phosphor

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layer being positioned between at least part of the top surface of the radiation source and the first contact layer along with the other features of claim 7.

The prior art of record fails to teach or disclose a light emitting device wherein the first contact layer reflects UV radiation along with the other features of claim 36.

The prior art of record fails teach or disclose a light emitting device wherein the first contact layer reflects visible light along with the other features of claim 37.

Claims 21 and 22 are allowed. The following is an examiner's statement for reasons for allowance.

The prior art of record does not teach the claimed visible light emitting device comprising a transparent substrate, a phosphor layer including one or more excitable, visible light-emitting phosphors, a radiation source positioned between the transparent substrate and the phosphor layer for providing a radiation to excite visible light emission from the phosphor layer, the radiation source having a first contact region and a second contact region, a first contact layer provided over at least part of the phosphor layer and reflecting at least some of the visible light emission from the phosphor layer back toward the transparent substrate, the first contact layer being electrically connected to the first contact region and a second contact layer being electrically connected to the second contact region along with the other features of claim 21.

Claims 40 and 41 are allowed. The following is an examiner's statement for reasons for allowance.

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The prior art of record does not teach the claimed visible light emitting device comprising a transparent substrate, an array of phosphor segments, each including a light emitting phosphor; an array of radiation sources positioned between the transparent substrate and the array of phosphor segments for selectively providing radiation to excite visible light emission from corresponding phosphor segments, each of the radiation sources having a first contact region and a second contact region; a number of column contact layers, each of the column contact layers being provided over at least part of the phosphor segments of the radiation sources that lie in a corresponding column of the array of radiation sources, the column contact layers reflecting at least some of the radiation that exits from the corresponding phosphor segments back into the phosphor segments, the column contact layers being electrically connected to the first contact regions of the radiation sources that lie in the corresponding column and a number of row contact layers, each of the row contact layers being electrically connected to the first contact regions of the radiation sources that lie in a corresponding row of the array of radiation sources as recited in claim 40.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Gerike whose telephone number is (703) 308-8991. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3594 for regular communications and (703) 305-3594 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0596.



Matthew J. Gerike
Patent Examiner
May 2, 2001



MICHAEL H. DAY
PRIMARY EXAMINER